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Customer Preferences for Restaurant Technology Innovations

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Abstract

When restaurateurs evaluate whether to adopt technology-based service innovations, they must consider not only the costs and benefits of that technology, but also customers' reactions to the procedural changes accompanying the innovation. Technology that damages customer satisfaction may not be worthwhile, no matter how much it reduces labor costs. In this report we present the results of a national survey on customers' perceptions of eleven restaurant technologies, as well as whether respondents use those technologies and the value they see in them. The technologies are pagers for table management, handheld order taking while waiting in line, internet-based ordering, kiosk-based payment, kiosk-based food ordering, online reservations, payment via SMS or text message, payment via (RFID) smart card, payment via cell phone using NFC technology, virtual menus available tableside with nutritional information, and virtual menus online with nutritional information. These technologies are categorized in the following five categories: kiosk, menu, online usage, payment-based service innovations, and queuing. Using a research technique called best-worst choice analysis, the study found that the technologies used most commonly were pagers and online reservations, while cell-phone payment was used hardly at all. The results show that the perceived value of a specific technology increases after the customers have had the opportunity to use it, and different demographic segments valued the technologies differently. Frequent technology users visited restaurants more often than infrequent technology users did.

Keywords

restaurant technology, customer preference, queue management, internet based ordering, menus, kiosks, payment technology

Disciplines

Business | Hospitality Administration and Management

Comments

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by Michael Dixon, Sheryl E. Kimes, Ph.D., and Rohit Verma, Ph.D.

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EXECUTIVE SUMMARY

When restaurateurs evaluate whether to adopt technology-based service innovations, they must consider not only the costs and benefits of that technology, but also customers' reactions to the procedural changes accompanying the innovation. Technology that damages customer satisfaction may not be worthwhile, no matter how much it reduces labor costs. In this report we present the results of a national survey on customers' perceptions of eleven restaurant technologies, as well as whether respondents use those technologies and the value they see in them. The technologies are pagers for table management, handheld order taking while waiting in line, internet-based ordering, kiosk-based payment, kiosk-based food ordering, online reservations, payment via SMS or text message, payment via (RFID) smart card, payment via cell phone using NFC technology, virtual menus available tableside with nutritional information, and virtual menus online with nutritional information. These technologies are categorized in the following five categories: kiosk, menu, online usage, payment-based service innovations, and queuing. Using a research technique called best-worst choice analysis, the study found that the technologies used most commonly were pagers and online reservations, while cell-phone payment was used hardly at all. The results show that the perceived value of a specific technology increases after the customers have had the opportunity to use it, and different demographic segments valued the technologies differently. Frequent technology users visited restaurants more often than infrequent technology users did.

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Customer Preferences for Restaurant Technology Innovations

by Michael J. Dixon, Sheryl E. Kimes, and Rohit Verma

When restaurant operators are considering whether to invest in a specific new technology, they need to consider not only the costs and potential benefits of those innovations, but they also must understand customers' potential reactions to that technology. In this report, we discuss how a sample of restaurant customers reacted to eleven technology innovations. As part of the study, we note how customers' preferences for a specific technology are related to their familiarity with that particular innovation. The technologies we studied can be classified into five broad categories: (**1**) queue management (e.g., pagers, handheld order taking), (**2**) internet based (e.g., online reservations, internet-based ordering), (**3**) menu, (**4**) kiosks, and (**5**) payment related. Each technology may provide benefits during one or more phases of the dining experience. Those phases are pre-arrival, post-arrival, pre-process, in-process, post-process, and table turnover (or post-departure). In a recent article in the *Cornell Hospitality Quarterly,* coauthor Sheryl Kimes provides additional details and descriptions of these dining experience stages.[1]

[1] S.E. Kimes, "The Role of Technology in Restaurant Revenue Management," *Cornell Hospitality Quarterly,* Vol. 49, No. 3 (2008), pp. 297-309.

To gauge our respondents' reactions to the eleven technologies, we used a relatively new customer-preference measurement technique known as best-worst analysis (also known as max-diff).[2] Best-worst analysis is based on customer-choice analysis, a technique which has been found to be extremely accurate in predicting customer choices.[3] The rest of the report is organized in the following manner. First, we summarize background research; second, we describe our research approach; third, we present our results; and fourth, we discuss the practical and managerial implications of our research.

Technology Changes Service Tactics

Technology innovations have changed the way in which customers use and experience services and in how businesses operate. ATMs, pay-at-the-pump gasoline, online commerce, self-check-in boarding-pass kiosks, and self-checkout lines at the grocery store are all examples of common technology-based service innovations used.

Well chosen technology provides benefits to both companies and to customers. Innovative technology can improve service-time perceptions,[4] reduce cost,[5] and increase productivity.[6] In addition, technological innovations have been shown to increase market share and improve customer satisfaction and retention.[7] Furthermore, consumers who use certain self-service technologies, such as online banking, have been shown to be more satisfied and less price sensitive, have higher intentions to repeat their purchase, and provide more positive word of mouth.[8]

While technology-based innovations can ameliorate the inherent human variability found in service interactions,[9] technology may also make it difficult to recover quickly from failures (when equipment magnifies an error) and may also reduce the server's personal connection with the customer.[10] Therefore, before adopting a particular technological system, a hospitality operator must assess potential benefits to customers (along with customers' reactions to the technology) and compare these benefits to the cost of the system. Potential customer benefits of technology-based service innovations include improved convenience

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2 See, for example: A. Finn and J.J. Louviere, "Determining the Appropriate Response to Evidence of Public Concern: The Case of Food Safety," *Journal of Public Policy and Marketing*, Vol. 11, No. 1 (1992), pp. 12-25; and S. Cohen and B. Orme, "What's Your Preference?," *Marketing Research*, Vol. 16 (2004), pp. 32-37.

3 R. Verma, "Unlocking the Secrets of Customer Choices," *Cornell Center for Hospitality Research Report*, Vol. 7, No. 2 (2007); www.hotelschool.cornell.edu/research/chr/pubs/reports/abstract-14342.html.

4 P.A. Dabholkar, "Using Technology-based Self-service Options to Improve Perceived Service Quality," in *Enhancing Knowledge Development in Marketing*, ed. M. Gilly (Chicago: American Marketing Association, 1990), pp. 534-535.

5 M. Sathye, "Adoption of Internet Banking by Australian Consumers: An Empirical Investigation," *International Journal of Bank Marketing*, Vol. 17, No. 7 (1999), pp. 324-334.

6 M.R. Kelley, "Productivity and Information Technology: The Elusive Connection," *Management Science*, Vol. 40, No. 11 (1994), pp. 1406-1425.

7 V.N. Polatoglu and S. Ekin, "An Empirical Investigation of the Turkish Consumers' Acceptance of Internet Banking Services," *International Journal of Bank Marketing*, Vol. 19, No. 4 (2001), p. 156.

8 N.P. Mols, "The Behavioral Consequences of PC Banking," *International Journal of Bank Marketing*, Vol. 16, No. 5 (1998), pp. 195-201 (retrieved from ABI/INFORM Global database), and T. Robinson, "Internet Banking: Still Not a Perfect Marriage," *Informationweek.com*, April 17, 2000, pp. 104-106.

9 J.M. Curran, M.L. Meuter, and C.F. Surprenant, "Intentions to Use Self-service Technologies: A Confluence of Multiple Attitudes," *Journal of Service Research*, Vol. 5, No. 3 (2003), pp. 209-224.

10 M.L. Meuter, L.A. Ostrom, R.I. Roundtree, and M.J. Bitner, "Self-service Technologies: Understanding Customer Satisfaction with Technology-based Service Encounters," *Journal of Marketing*, Vol. 64, No. 3 (2000), pp. 50-64; and M.J. Bitner, "Service and Technology: Opportunities and Paradoxes," *Managing Service Quality*, Vol. 11, No. 6 (2001), pp. 375-379.

and increased control.[11] Potential benefits to the restaurant include increased speed of service, reduced processing costs, increased volume and revenue, and improved service and food quality.[12] We review these benefits briefly in the next section.

Benefits to Customers

Improved convenience. Service convenience is related to customers' desire to conserve their time and effort. An increase in convenience is associated with an increase in satisfaction.[13] Restaurants can use technology to increase access convenience (e.g., by making it easier to place a food order or make a reservation), to speed transaction convenience (for instance, by reducing customers' waiting time), and to improve benefit convenience (say, by better managing the pace of the dining experience). The potential improvements in these types of convenience, of course, varies by restaurant segment. For example, quick-service restaurants would focus on transaction convenience by delivering their meals quickly and consistently, while benefit convenience would be a consideration for casual restaurants by controlling the pace of the meal. By contrast, fine-dining restaurants may provide access convenience by making it easier to make a reservation, but not attempt to manipulate the other types of convenience.

Increased control. Control is defined as the need to demonstrate one's competence, superiority, and mastery over the environment.[14] Research has shown that customers are more likely to be satisfied with a service encounter when they perceive that they have substantial control over that encounter.[15] On the other hand, when self-service innovations are forced on customers (in the guise of improvement, for example), Reinders, Dabholkar, and Framback found that customers were dissatisfied.[16] That finding underlines the cautionary note that customers do not approve of innovations that reduce their perceived control of the service encounter. Therefore, when introducing technology-based innovations in restaurants it is important to ensure that customers perceive that they have more control over the service encounter and that their sense of control of the encounter has not been eroded. As we explain next, past research has shown that customers' perceived control can be subdivided into the following three categories: behavioral, cognitive, and decisional.[17]

Customers have behavioral control when they can directly influence or modify what happens to them.[18] In restaurants, customers can exert behavioral control by choosing the time they eat, minimizing their wait, or choosing their desired table, and, of course, by choosing what they would like to eat

Cognitive control is related to the predictability and interpretability of a situation. Research has shown that providing guests with supplemental information (such as the likely length of their wait) leads to a more positive evaluation of the service. If restaurants can provide accurate wait time estimates or use technology to increase product and service consistency, they will give customers heightened cognitive control.

Finally, decisional control concerns the control that a customer has over the selection of outcomes and goals. Restaurant customers who have to wait to be seated can choose to stay at the restaurant, leave and return, or leave altogether. To avoid a wait, they can choose to make their reservation and then decide whether to make that reservation online or by telephone. Paging systems give waiting customers more decisional control because in many cases (particularly with cell phone pagers), customers have the freedom to leave the restaurant and return when they are paged. Once again, though, we must caution that customers who are not given a choice on whether to use a self-service technology are frequently less satisfied, due to reduced behavioral control.[19]

Benefits to the Restaurant

Service speed. In general, if service speed can be accelerated, more customers can be served. Depending on the stage of the meal, customer satisfaction can be enhanced by

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[11] S.E. Kimes, "The Role of Technology in Restaurant Revenue Management," *Cornell Hospitality Quarterly*," Vol. 49, No. 3 (2008), pp. 297-309.

[12] *Ibid.*

[13] L.L. Berry, K. Seiders, and D. Grewal, "Understanding Service Convenience," *Journal of Marketing*, Vol. 66, No. 3 (2002), pp. 1-17; and S.R. Colwell, M. Aung, V. Kanetkar, and A.L. Holdern, "Toward a Measure of Service Convenience: Multiple-item Scale Development and Empirical Test," *Journal of Services Marketing*, Vol. 22, No. 2 (2008), pp. 160-169.

[14] M.K. Hui and R. Toffoli, "Perceived Control and Consumer Attribution for the Service Encounter," *Journal of Applied Social Psychology*, Vol. 32, No. 9 (2002), pp. 1825-1844.

[15] D. Ariely, "Controlling the Information-flow Effects on Consumers' Decision Making and Preferences," *Journal of Consumer Research*, Vol. 27 (September 2000), pp. 233-248; Averill, *op.cit.*; M.K. Hui and J.E.G. Bateson, "Perceived Control and the Effects of Crowding and Consumer Choice on the Service Experience," *Journal of Consumer Research*, Vol. 18, No. 2 (1991), p. 174; Hui and Toffoli, *op.cit.*; M.K. Hui and D.K. Tse, "What to Tell Consumers in Waits of Different Lengths: An Integrative Model of Service Evaluation," *Journal of Marketing*, Vol. 60, No. 2 (1996), pp. 81-90; Kimes, *op.cit.*; and E.J. Langer, *The Psychology of Control* (Beverly Hills, CA: Sage, 1983).

[16] M.J. Reinders, P.A. Dabholkar, and R.T. Frambach, "Consequences of Forcing Consumers to Use Technology-based Self-service," *Journal of Service Research*, Vol. 11, No. 2 (2008), pp. 107-123.

[17] J.R. Averill, "Personal Control over Aversive Stimuli and Its Relationship to Stress," *Psychological Bulletin*, Vol. 80, No. 4 (1973), pp. 286-303.

[18] Hui and Bateson, *op.cit.*

[19] Reinders *et al., op.cit.*

Respondents seemed more comfortable with innovations to early dining stage technologies (e.g., virtual menus, pagers) than with various payment options in later stages.

increased service velocity, as should revenue (at least during periods of high demand).[20]

Technology can speed up service by reducing the order-taking time (e.g., through the use of handheld in-queue order-taking devices); by providing advance order information to kitchen (through the use of electronic display systems in the kitchen); by tightening service time (through the use of table-management systems); by shortening payment time (through handheld devices); and by cutting turnover time (through the use of communications technology and table-management systems). While faster and consistent service will almost always lead to improved customer satisfaction in quick-service restaurants and fast-casual restaurants, it must be managed carefully in casual, upscale-casual, and fine-dining restaurants, so that customers do not feel that they are being rushed.[21] Time reductions should be focused in the pre-process stage (before the first food order is delivered) and the post-process stage (after the check is requested) if at all possible. Efforts to increase the pace of the actual meal experience (from when the first food order is delivered until the check is requested) are likely to result in lower customer satisfaction.[22]

Reduced processing cost. Technology can also help to reduce labor costs. When on-line and off-site reservations and orders are taken or when kiosks and other self-service approaches are used to assist with ordering and payment, labor costs for reservations and order-receiving functions should decrease.

Increased volume and revenue. Online reservations and ordering provide an additional distribution channel that assists in attracting customers and makes restaurants more accessible to customers. For example, over half (59%) of restaurants using on-line reservations and on-line ordering reported seeing sales increase as a result.[23] Recent research found that many on-line reservations are made during periods when restaurants are not normally open,[24] which means that the restaurant is most likely capturing business it might not otherwise receive.

Improved service and product quality. Appropriate use of technology can also help a restaurant provide better and more consistent service to its guests. Pager systems can help restaurants better manage the waiting experience, for example, and table-based payment options can help streamline the payment procedure. Research has shown that an increase in perceived service and product quality leads to an increase in customer satisfaction and restaurant profit.[25]

While technology-based service innovations certainly have benefits, many restaurant operators have been concerned about customers' preferences for and use of specific technologies, the technologies' impact on service quality, and their associated cost. By understanding how customers evaluate technologies and how likely they are to use them, managers can make better decisions on which technologies to adopt.

Best-Worst Choice Analysis

The underlying problem in assessing customer preferences is that purchasing decisions are made on the basis of many different (and even competing) criteria such as brand, qual-

[20] Restaurant managers should be cautious in their expectations regarding increased service speed. See: Gary Thompson, "(Mythical) Revenue Benefits of Reducing Dining Duration," *Cornell Hospitality Quarterly*, Vol. 50, No. 1 (February 2009), pp. 96-112.

[21] B.M. Noone and S.E. Kimes, "Dining Duration and Customer Satisfaction," *Cornell Hospitality Report* Vol. 5, No. 9 (2005); Center for Hospitality Research, www.hotelschool.cornell.edu/research/chr/pubs/reports/abstract-13590.html; and B.M. Noone, S.E. Kimes, A.S. Mattila, and J. Wirtz, "The Effect of Meal Pace on Customer Satisfaction," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 48, No. 3 (August 2007), pp. 231-244.

[22] Noone and Kimes, *op.cit.*; and Noone *et al., op.cit.*

[23] J. Lang, "Is the Web Really a Sales Builder?," *Restaurant Business*, May 2006, pp. 11-12.

[24] T. Layton, "The Internet Is Changing Dining-out Behavior. Are You Ready?," *Savoir Faire*, February 2006, p. 1; and J.R. Ross, "Online Reservations Technology Gains Ground," *Nation's Restaurant News*, June 26, 2006, p. 68.

[25] R.T. Rust, A.J. Zahorik, and T.L. Keiningham, "Return on Quality (ROQ): Making Service Quality Financially Accountable," *Journal of Marketing*, Vol. 59, No. 2 (1995), pp. 58-70.

ity, performance, price, and features.[26] This problem is further compounded in service applications where customers also consider nontangible features and characteristics of the market offerings (e.g., service quality, safety and trust, interactions with service providers). For example, customers might choose fast-food establishments based on their cost, service quality, food quality, food variety, and speed of delivery attributes. Similarly customers might choose a hotel based on its location, brand name, various facilities, service quality, price, and loyalty program.

Discrete choice modeling can be used to help companies more accurately understand the drivers of customer choices.[27] Discrete choice modeling allows the prediction of market performance of new or existing services with remarkable precision even for seemingly complex and erratic market conditions. Recent studies have demonstrated that the discrete choice framework is effective in modeling the choice behavior of customers when exploring hospitality service designs.[28]

Traditional discrete choice models work well when customers must choose among a bundle of service offerings (e.g., select one restaurant from a set of several). However, in many applications, customers do not have to select a bundle of attributes, but instead they state their relative preferences for different features within the service offering (e.g., relative preferences for cuisines, décor type, or technology). This is the basis of the choice-based approach known as best-worst or maximum-difference (max-diff) analysis, which provides unbiased estimates of the relative value rankings for a set of alternatives.[29] The best-worst approach requires respondents to identify what they consider to be the best and the worst alternatives on a particular dimension in each experimental set (e.g., attractiveness, satisfaction).

Designing and Conducting Best-Worst Experiments

Best-worst experiments require that a representative sample of customers make choices in simulated situations derived from realistic variations of actual service offerings. Generally, the following three steps are taken.[30]

(**1**) Develop a list of alternatives that are believed to influence customers' buying decisions, using qualitative market assessment, customer interviews, case studies, industry data, focus groups, and other information sources. For this study, the alternatives are the eleven restaurant technologies in question, which are pagers for table management, handheld order taking while waiting in line, online reservations, internet-based ordering, virtual menus available tableside with nutritional information, virtual menus online with nutritional information, kiosk-based payment, kiosk-based food ordering, payment via SMS or text message, payment via smart card (RFID-enabled), and payment via cell phone using NFC technology.

(**2**) Construct best-worst choice experiments, in which respondents select what they consider to be the best and worst alternative out of several options available to them in a series of choice sets. Each choice set includes a subset of the alternatives identified in step one. Factorial design approaches are used to ensure that each alternative appears an equal number of times in the various experiments. This study, for example, employed various subsets of the eleven restaurant technologies that we were testing. Several subsets are shown to each respondent and they choose the best and worst within each subset.

(**3**) After data collection from a representative sample of respondents, a mathematical model is developed to illustrate the relative value (or attractiveness) of each option.[31] Using the above approach we calculated the relative value that our respondents assigned to the eleven restaurant technologies.

The Study

To develop our list of technologies, we used a detailed literature review, interviews with restaurant executives, and information provided by *Hospitality Technology*.[32] As mentioned earlier, we divided these technologies into the following five categories: queue management, internet-based, menu, kiosk, and payment (see Exhibit 1, overleaf). In Exhibit 2 we show how each technology fits into the five stages of the dining experience that we outlined above.[33] In addition to assessing customers' views of these technologies, we also were interested in whether customers had used them.

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[26] D. McFadden, "The Choice-theory Approach to Market Research," *Marketing Science*,Vol. 5, No. 4 (1986), pp. 275-297.

[27] Verma, *op.cit.*

[28] R. Verma and G. Plaschka, "The Art and Science of Customer Choice Modeling: Reflections, Advances, and Managerial Implications," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 44, No. 6 (December 2003), pp. 156-165, R. Verma, G. Plaschka, and J. Louviere, "Understanding Customer Choices: A Key to Successful Management of Hospitality Services," *Cornell Hotel and Restaurant Administration Quarterly*, Vol 43, No 6 (December 2002), pp. 15-24.

[29] A. Finn and J.J. Louviere,"Determining the Appropriate Response to Evidence of Public Concern: The Case of Food Safety," *Journal of Public Policy and Marketing*, Vol. 11, No. 1 (1992), pp. 12-25.

[30] R. Verma, G. Plaschka, and J. Louviere, "Configuring Service Operations in Accordance with Customer Needs and Preferences," *Journal of Service Research,* Vol. 1, No. 3 (1999), pp. 262-274.

[31] Verma *et al.* (2002), *op.cit.*

[32] www.htmagazine.com/

[33] Kimes, *op.cit.*

Exhibit 1

Restaurant technologies tested

Service innovation category	Technology	Definition
Queue management	Pagers for table management Handheld order taking while waiting in line	Alerts customers when their table is ready Order taken while customers are in line and transmitted to the kitchen
Internet-based	Online reservations Internet-based ordering	Make reservations online Order online for pick-up or delivery
Menu-based	Virtual menus available tableside with nutritional information Virtual menus online with nutritional information	Electronic menus that have nutritional information of the restaurant's menu Online menu with nutritional information tableside
Kiosk	Kiosk-based payment Kiosk-based food ordering	Payment using a touch screen terminal Order taken on a touch screen terminal
Payment	Payment via SMS or text message Payment via 'smart' card (RFID-enabled) Payment via cell phone using NFC technology	Payment made using a cell phone Payment made with a RFID enabled credit card Payment made with a near fields communication (NFC) cell phone

Exhibit 2

Benefits derived by dining stages

Technology	Pre-arrival	Post-arrival	Pre-process	In-process	Post-process
Pagers for table management		X			
Handheld order taking while waiting in line		X			
Online reservations	X				
Internet-based ordering	X				
Virtual menus available tableside with nutritional information				X	X
Virtual menus online with nutritional information	X				
Kiosk-based payment					X
Kiosk-based food ordering		X	X	X	
Payment via SMS or text message					X
Payment via "smart" card (RFID-enabled)					X
Payment via cell phone using NFC technology					X

Survey and response. We conducted a nationwide, online survey of a balanced sample of restaurant visitors within the United States during summer 2008. Along with the best-worst queries, the survey included questions on technology use and demographic characteristics. The survey was launched to a random sample of 2,000 potential respondents across the United States. We received a total of 1,737 useable responses from a group evenly split between men and women. About 10 percent of the respondents were under the age of 25, 28 percent were over the age of 55, and the remaining 62 percent were between 25 and 54. The respondents were well-educated: 40 percent had either a college or graduate degree, 38 percent had some college, and the remaining 22 percent had a high school degree or less. We will first present our general results and then discuss the results of the best-worst experiments.

Dining patterns. We asked general questions about dining frequency at different types of restaurants (see Exhibit 3). Fast-food restaurants were visited the most frequently (25 times per year), followed by fast-casual restaurants (16 times per year) and casual-dining restaurants (13 times per year). On average, our respondents visited some type

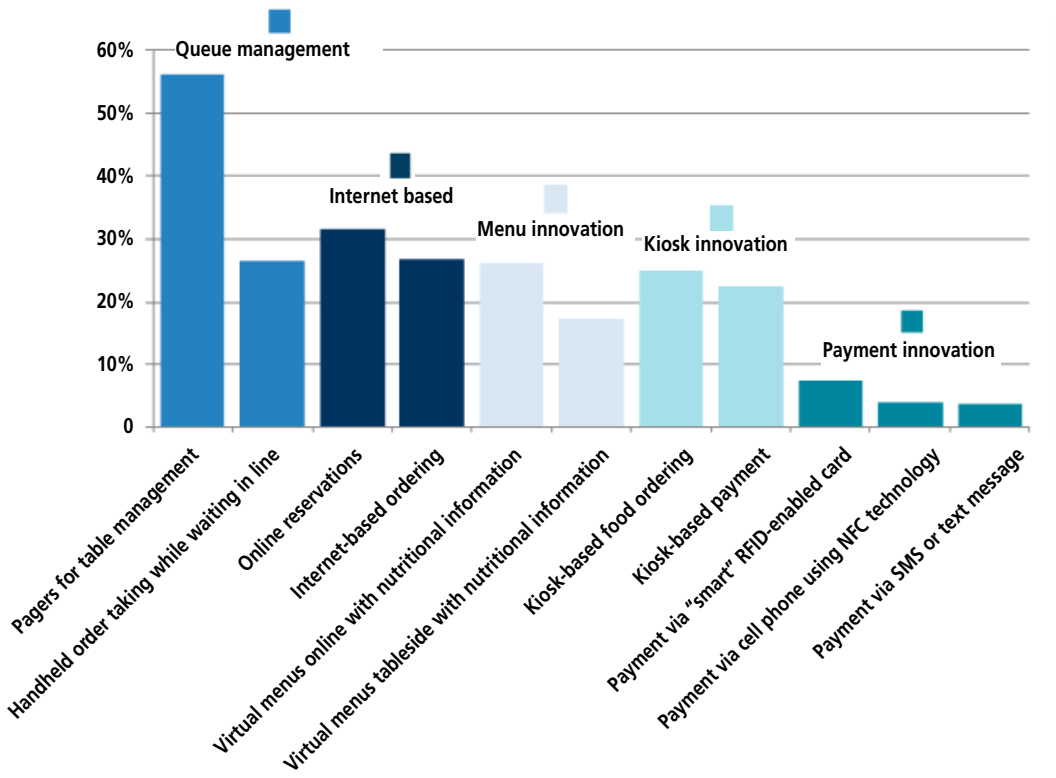
Exhibit 3

Visits per year per restaurant segment

	All Respondents	Age Groups		
		Less than 35 yrs	35 to 54 yrs	55 yrs and older
Kiosk/Café	12	21	9	6
Fast Food	25	39	22	15
Fast Casual	16	24	14	11
Casual	13	18	10	12
Upscale Casual	5	8	4	4
Fine Dining	4	7	2	3
Total Yearly Restaurant Visits	75	117	62	51

Exhibit 4

Technology use (percentage of respondents)



of restaurant 75 times per year. We also found that younger responders visited restaurants more regularly than did older participants.

Prior to the best-worst experiments, we asked respondents to specify whether they had used any of the technologies described in Exhibit 1. The most highly used technologies were pagers (56%) and online reservations (32%). Cell-phone payment technologies were hardly used at all (see Exhibit 4).

We found that younger participants were likely to have used more of the technologies than the older respondents were (Exhibits 5 and 6), but gender had no relationship to technology use.

Exhibit 5

Distribution of technology use by respondents

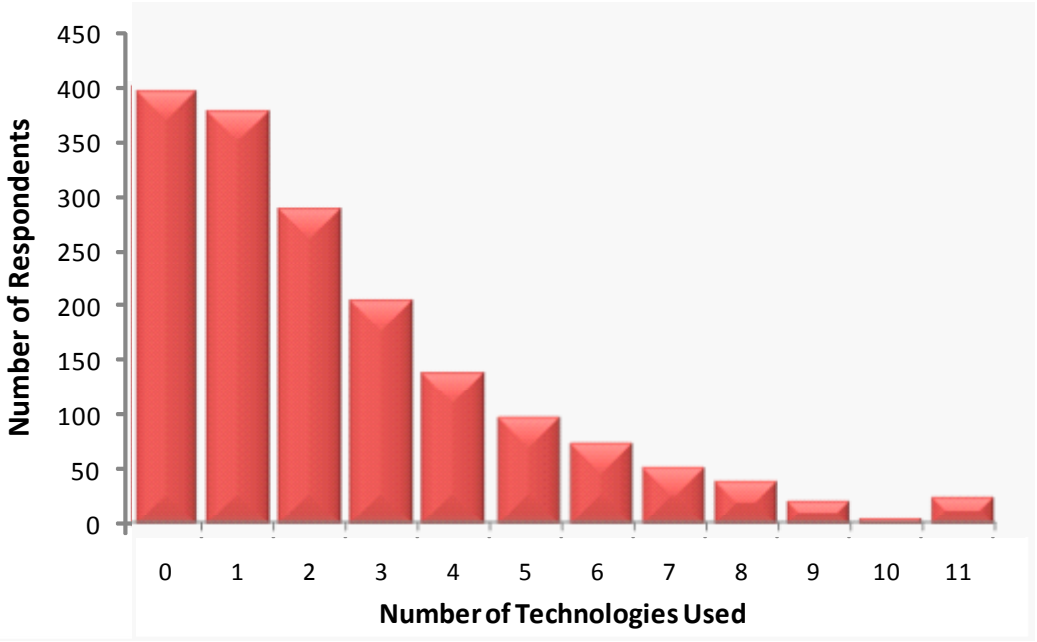


Exhibit 6

Technology use by age group

		Age Groups		
		Under 35	35 to 54	55 and older
Queue management	Pagers for table management	63%	55%	50%
	Handheld order taking while waiting in line	31%	24%	25%
Internet based	Online reservations	45%	30%	18%
	Internet-based ordering	43%	25%	12%
Menus	Virtual menus online with nutritional information	42%	24%	12%
	Virtual menus available tableside with nutritional information	24%	15%	13%
Kiosks	Kiosk-based food ordering	38%	22%	15%
	Kiosk-based payment	35%	21%	11%
Payment	Payment via "smart" card (RFID-enabled)	12%	6%	5%
	Payment via cell phone using NFC technology	8%	3%	1%
	Payment via SMS or text message	8%	2%	1%

Customers' Relative Preferences for Restaurant Technologies

The primary purpose of this research was to determine the customer value for the eleven different restaurant technologies, using the approach of asking respondents to select the best and worst alternative out of the technologies listed in a series of eight choice sets (please see Exhibit 7, overleaf, for an example). Verbal and pictorial descriptions of each restaurant technology were also provided (Exhibit 8).

For the sake of clarity in quantifying the respondents' relative technology preferences, we present them in the form of percentages ranging from zero to 100. A score of 100 percent signifies the most valuable technology while zero indicates an unattractive technology (Exhibit 9). A score of 50 means the technology was neither attractive nor unattractive.

Exhibit 7

Sample best-worst choice set template

Listed below are several restaurant technology options. Please indicate the options that are **most** and **least** attractive to you.

Least Attractive	Technology	Most Attractive
	Pagers for table management	
	Kiosk-based payment	
	Payment via SMS/text-messaging	
	Online reservations	
	Handheld order-taking	
	Virtual menu online	
	Internet-based ordering	

Note: This is a sample only. Each choice set comprised a different group of technologies.

Exhibit 8

Sample illustrations and descriptions of restaurant technologies

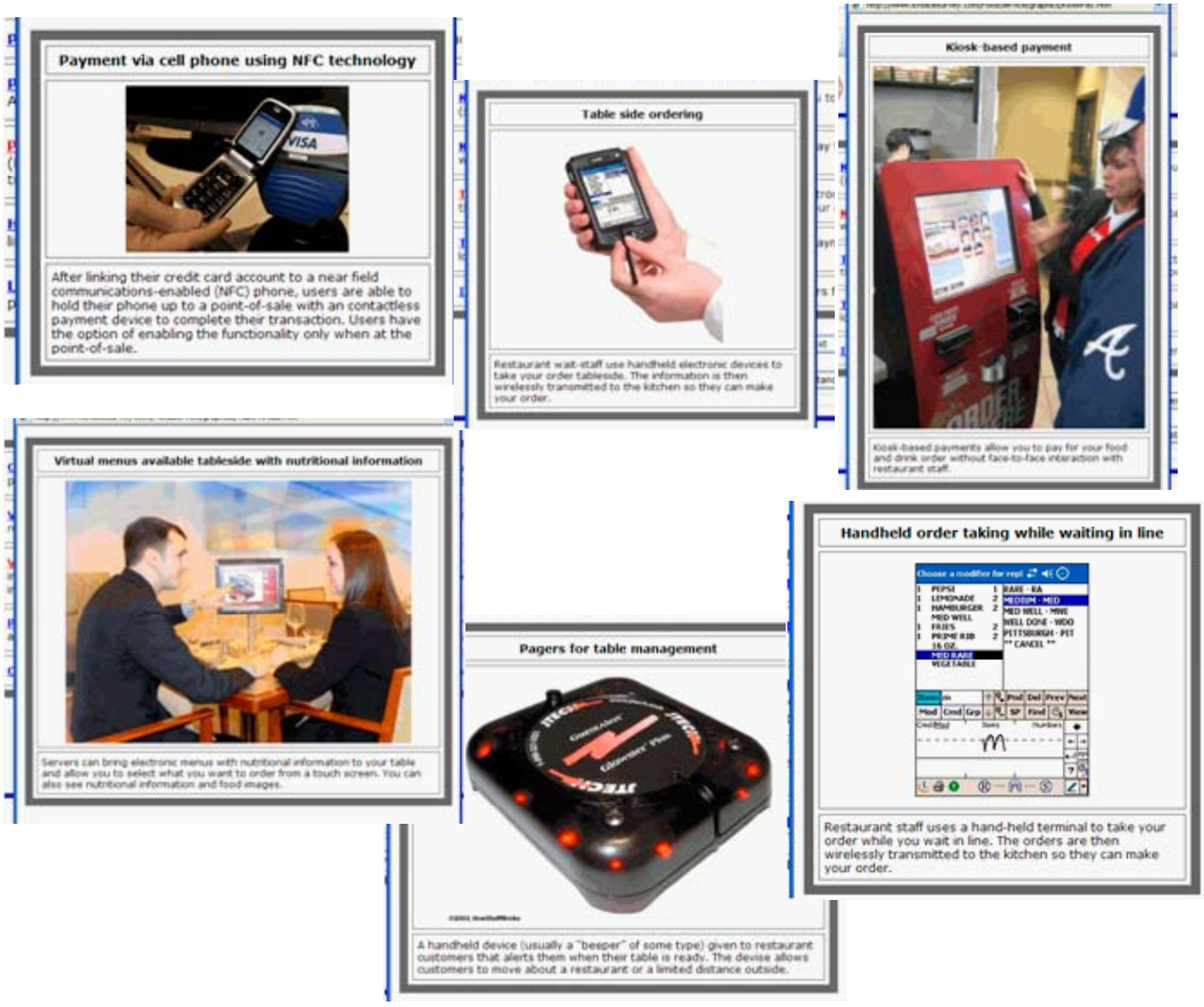
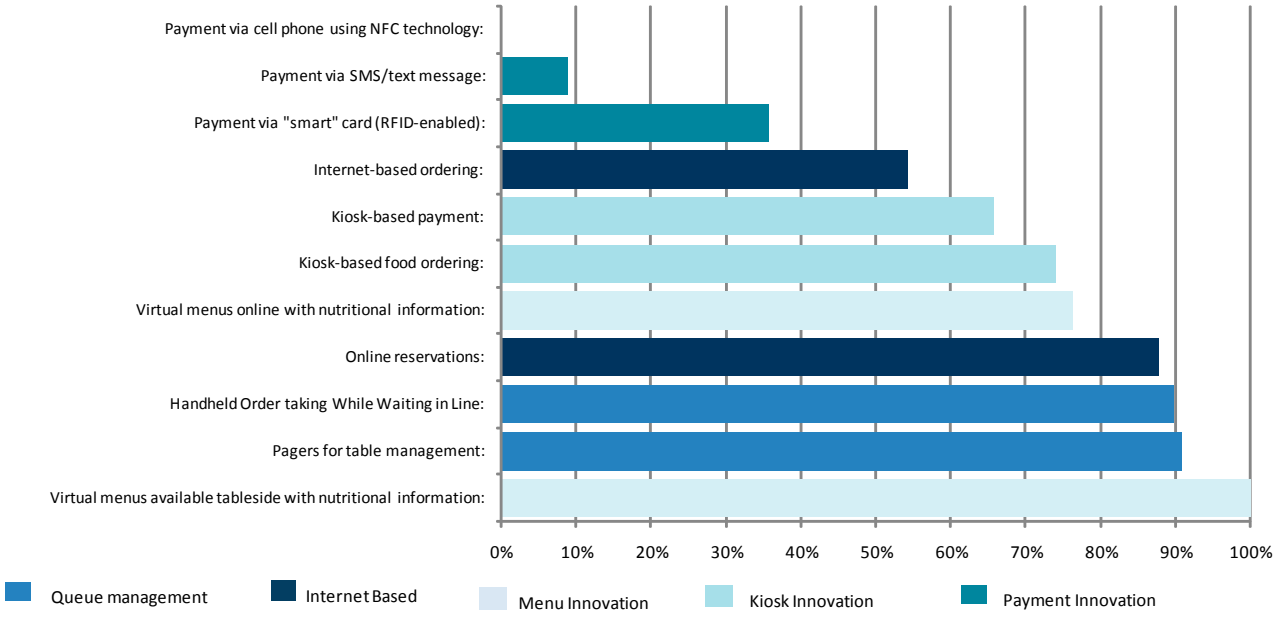


Exhibit 9

Respondents' value assessment of restaurant technologies



The reader should note that the above scores are relative measures, implying that the scores are only with respect to the eleven technologies considered in this study.

Our respondents considered tableside virtual menus with nutritional information to be most valuable among the eleven technologies presented to them. They found pagers, handheld order taking, and online reservations also to be very valuable (ranked together in close succession). The kiosk-related technologies (e.g., kiosk-based ordering) were valued neither high nor low. Respondents gave only a middling rating to internet ordering, but they took a particularly dim view of cell-phone-based payment systems, and even smart-card payment was rated of little value.

The Impact of Technology Use on Value

Looking at the question of whether familiarity with a particular technology boosted its perceived value, we note that respondents who had used a technology assigned that technology a 25-percent higher value on average than did non-users (Exhibit 10, next page). More specifically, respondents who had used internet-based ordering accorded it more than twice the value than did non-users (79% vs. 39%), those who had used pagers found them to be almost 70-percent more valuable than nonusers (84% vs. 50%), and those who had made online reservations considered them to have nearly 50-percent higher value than did nonusers (91% vs. 59%). In contrast, although users of some technologies such as handheld ordering and virtual menus available tableside with nutritional information considered them to have more value than did nonusers, the incremental benefit was much lower (15 percent for handheld ordering and 12 percent for virtual menus).

Our results imply that restaurant operators should actively encourage customers to try new technologies, although we consider it unlikely that new technology will entirely supplant existing procedures. For example, as kiosk-based food ordering becomes more popular in fast-food restaurants, we doubt that it will completely replace counter staff. In promoting the new technology, a company would do well to implement some sort of customer training program to encourage people to try the technology. A key point here is that any such program should encourage their customers to use the technology, but should not force them to do so.

Conclusions and Managerial Implications

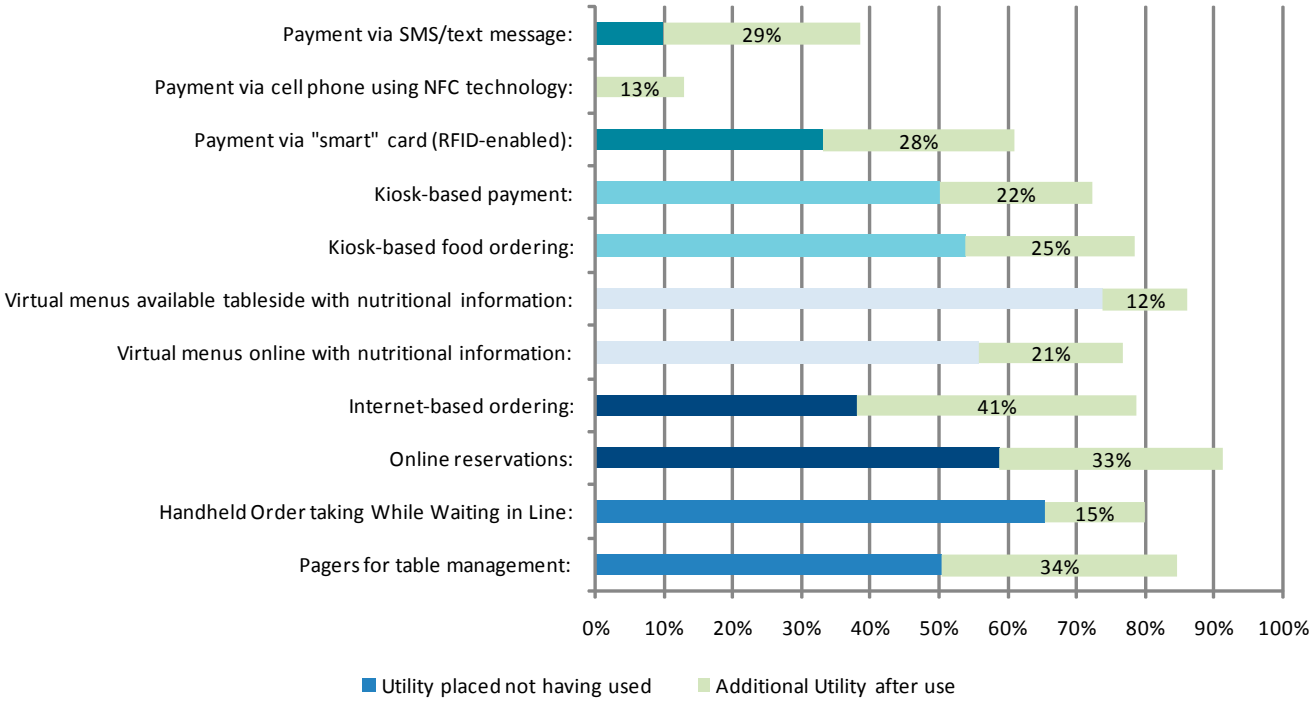
Our study has important implications for restaurateurs, technology developers, and researchers. While the list of eleven technologies in this study is by no means exhaustive, our results show that the consumers do not perceive every technological innovation to be equally valuable.

The most frequently used technologies were pagers (56% of all respondents), online reservations (32%), internet-based ordering (27%), and handheld order taking (27%). Not surprisingly, customers place higher value on technologies that they have used and are familiar with (otherwise, they probably wouldn't use them).

Since customers usually need to use technology before they are able to place a value on it, we suggest that

Exhibit 10

Comparison of technology values given by users and non-users



technology developers should make technologies inviting and easy to use and that restaurants should find ways to encourage customers to use new technologies. Then, when customers do try the technology, restaurants should focus on demonstrations and customer assistance until customers are acclimated to the new technology. As a technology becomes more widely accepted, less customer training will be required. At no time should customers feel forced to use a technology with which they are not fully comfortable. Instead, restaurants should do their best to encourage such use. In particular, we would like to caution the reader to not take a simplistic view related to the relationship between use and value of a technology. It is quite possible that guests who choose to use a technology may already perceive its high value. In other words, a reverse causality is highly likely. That is, perceived value may increase technology use rather than use augmenting value. We will need to explore the relationship between value and use in detail in future research.

When comparing the relative preferences of technologies studied with the stages of the dining experience (as shown in Exhibit 2), we noticed that the earlier dining-stage technologies (e.g., virtual menus, pagers) seem to be preferred compared to later stages (e.g., various payment options). For example, the results presented in Exhibit 9 showed that payment-related technologies were considered less valuable than order-taking or queue-management technologies (e.g., pagers, or` nutritional information provided at the table).

Restaurateurs must determine whether a specific technology is appropriate for their restaurant. We believe that customers have become accustomed to technology that can be used to improve communications, increase efficiencies, and reduce errors. This, in conjunction with our study, implies that customers will be open to using new restaurant technologies if they receive sufficient value from those technologies.

We will most certainly see more restaurants relying on technology to create a competitive advantage. While these technological approaches might find success in certain segments, they must still be grounded in some sort of service concept and not just a technological concept. To be economically sustainable, technology must do something that adds value in the eye of the customer. So, while technology might take away some aspects of personal service, it may improve service quality. If customers believe that an innovation adds sufficient value, it is probably here to stay. ■

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